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February 20, 2013

Mr. Corey Webb
Section Chief
Voluntary Remediation Program
Office of Land Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

Re: ***Second Revised Work Plan for the Third Round of CAP18 ME™ Injections and Interim Remediation Alternative Description Summary***

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Mr. Webb:

Per discussions at our February 7, 2013, meeting with staff from the Indiana Department of Environmental Management (IDEM), on behalf of AMMH, we are pleased to submit a *Second Revised Work Plan for the Third Round of CAP18 ME™ Injections* ("Second Revised Work Plan"). The *Second Revised Work Plan* is nearly identical to the *Revised Work Plan for the Third Round of CAP18 ME™* submitted to IDEM on May 2, 2012, except that additional injection locations have been added in some areas of the chemical source areas to provide more complete treatment of remaining chlorinated solvents.

At the suggestion of your staff, below we have summarized the Work Plan's key components. This summary has been prepared in a format recommended by your staff to succinctly outline the interim remedial alternative being implemented at Michigan Plaza, the goals of the remedy, the data that will be collected to determine its effectiveness, and the steps that will be taken if the remedial goals are not being met.

WHAT REMEDY WILL BE USED?

The remedy selected for treatment of groundwater impacts is in-situ bioremediation followed by monitored natural attenuation (MNA). This involves the injection of a bioremediation catalyst, CAP18 ME™, a refined, food-grade soybean oil into groundwater that stimulates anaerobic bioremediation of chlorinated solvents via a reductive dechlorination pathway.

Why Was the Remedy Chosen?

The remedy was selected because of its proven effectiveness in treating chlorinated solvent impacts in groundwater. The primary advantages of this technology are that it is non-disruptive in nature, does not require on-going maintenance activities and does not present a threat to human health or environmental quality since the soybean oil is food-grade quality. Since impacted groundwater is not removed from the subsurface or treated and then discharged above the ground surface, there are no concerns with direct contact with the water, and as such, no possibility of direct human or ecological exposure. Since the product is food-grade quality, a health risk associated with either dermal contact or ingestion is not present, even during injection. In addition to the decreased risk of environmental impact by using this method, it also causes essentially no disturbance to the Site and surrounding area, which is desirable since there are active business operations, street traffic, and residential apartments near the soil and groundwater impacts.

Where Will the Remedy Be Applied?

The remedy will be applied to the three previously identified and delineated chemical source areas (**Source Areas A, B and C**) located on the Michigan Plaza property and at the southern end of the Maple Creek Village property. The source areas are associated with the releases of perchloroethylene (PCE) from previous dry cleaning operations at the former Accent Cleaners, which operated on the Michigan Plaza property prior to AMMH's acquisition of the property in 1999. **Source Area A** is located at the Michigan Plaza building in the vicinity of a former dry cleaner and its connecting sewer line. **Source Area B** is along the same sewer line near the northern Michigan Plaza property line and extends immediately north of Michigan Street at the sewer line junction with the main east-west sewer. **Source Area C** is located further east along the east-west sewer line in the southeast corner of the Maple Creek Village apartments, immediately west, north and south of Apartment Building No. 1.

MUNDELL performed the initial CAP18™ injection in August 2007, with a second 'booster' CAP18™ ME™ injection completed in February 2009.

How Will the Remedy Be Applied?

The technology will be applied through a series of CAP18 ME™ injections into the subsurface using a Geoprobe rig under the supervision of MUNDELL. A detailed description of the specific methods utilized is provided in the attachment to this summary document.

WHAT IS THE GOAL OF THE REMEDY?

The goal of the groundwater remediation is to achieve significant chemical source reduction through the biotransformation of PCE and its breakdown daughter products trichloroethylene (TCE), cis-1,2-Dichloroethene (cis-1,2-DCE) and Vinyl Chloride (VC) to carbon dioxide and water, thereby achieving groundwater concentrations that are at acceptable regulatory levels protective of human health and the environment. In addition, this will also result in acceptable concentrations of these same chemicals in the indoor air of the Michigan Plaza building and the nearby Maple Creek Village apartment buildings. Specific cleanup criteria for

soil, groundwater and indoor air will be set forth in a Revised Remediation Work Plan submitted to and approved by IDEM.

How Will the Remedy Achieve the Goal?

The remediation will occur through biochemical reactions known as the reductive dechlorination process.

What are the Remedial Cleanup Criteria?

The remedial cleanup criteria will be submitted in a Revised Remediation Work Plan during the 2nd Quarter of 2013.

WHAT DATA WILL BE USED TO DETERMINE IF/WHEN THE REMEDY IS EFFECTIVE?

Soil data previously collected during the investigation phases of the Michigan Plaza site beneath the plaza building and adjacent to the impacted area beneath the sewer line will be used to determine the achievement of soil closure goals. Confirmation sampling by IDEM in selected areas may be completed to further demonstrate achievement of remediation goals. Groundwater data collected during the historical and ongoing quarterly monitoring events will be used to determine the effectiveness of the groundwater remediation efforts. Vapor mitigation system data from seven (7) operating systems and indoor air quality data from the plaza building and three Maple Creek Village apartment buildings will be used to assess the cleanups effectiveness for achieving acceptable indoor air.

The groundwater data indicating the levels of PCE, TCE, cis-1,2-DCE and VC from both upgradient and downgradient monitoring wells will be analyzed for absolute concentration values and trends to assess the status of the remediation.

What are the Monitoring Parameters?

Groundwater samples will be tested for the shorter list of shorter list of Volatile Organic Compound (VOC) analysis (PCE, TCE, Cis-1,2-DCE, VC) utilizing U.S. EPA SW-846 Method 8260. The in-situ geochemical parameters temperature, pH, dissolved oxygen, conductivity and oxidation-reduction potential will be measured using the Troll 9500 multi-parameter meter to help determine if conditions naturally conducive to natural attenuation continue to exist in the aquifer. Additional aquifer parameters, consisting of nitrate/nitrite (EPA 353.2), sulfate (ASTM D512-90,02), ferrous iron (field test - 1,10 Phenanthroline), total organic carbon (SM 5310C), methane (AM20GAX), ethane (AM20GAX) and ethene (AM20GAX) will be analyzed to evaluate indicator compound breakdown and redox-sensitivity. Finally, volatile fatty acids (VFA) will be tested to evaluate the bioremediation substrate CAP18 ME™ distribution and lifetime duration of the substrate product.

Vapor mitigation stack air samples and indoor air samples will be tested for the shorter list of VOCs using Method AM4.02.

What is the Sampling Frequency?

The sampling frequency for groundwater and vapor mitigation air samples will continue to be on a quarterly basis. The frequency for indoor air is currently completed on an annual basis.

When Will the Results Be Submitted to IDEM?

The results will be provided to IDEM in the Quartering Monitoring Reports submitted at the end of the month following each sampling quarter.

How Will the Monitoring Data be Evaluated?

The data will be provided in both tables and graphical form (trend charts) and will be compared to both the remedial goals and the upgradient groundwater quality. Active remedial action at the Site will conclude with demonstration through confirmation sampling that applicable remedial cleanup criteria, as set forth in an approved Remediation Work Plan.

WHAT HAPPENS IF THE REMEDIAL GOAL IS NOT MET BY THE REMEDY?

If the goals have not been achieved, further analysis will be conducted to determine the reason behind the observed behavior of the remaining chlorinated plumes and what, if any, active remedial action steps can be conducted to achieve the goals.

How is This Evaluated?

This data will be reviewed and analyzed using statistical methods to demonstrate the chlorinated plumes are stable or decreasing. In addition, if necessary, groundwater and air transport modeling will be completed to demonstrate that the plumes will not pose unacceptable risk to human health and the environment. Reviews of in-situ geochemical parameters will be made to determine if the bioremediation processes are still active and effective, and if additional chemical source area specific injections may be beneficial. Site-specific soil gas, indoor air and vapor mitigation system stack air sample results will be analyzed to determine if the remedial goals are being met, or that site-specific adjustments to those goals can be made in light of actual exposures. Finally, additional site-specific engineering and institutional controls will be considered as part of a formal closure strategy if it is deemed necessary.

When Will This Be Evaluated?

This data will be reviewed and evaluated on a quarterly basis as it is generated. In order to allow sufficient time for the new injections to work, absent unusual circumstances, we would not expect to re-evaluate the need for more specific action until at least 12 months after the injection.

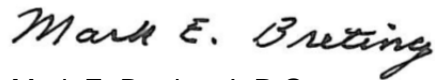
What Steps are in Place to Correct the Situation?

If sufficient remedial progress has not been made, or if the remedial goals have not been achieved, MUNDELL, together with AMMH, will meet with IDEM to discuss specific action steps to meet cleanup progress objectives or achieve the remedial goals. If necessary and appropriate, additional injections will be considered as part of the strategy.

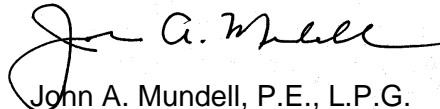
CLOSING

We appreciate the opportunity to provide this information to IDEM and look forward to IDEM's approval for implementation. If you should have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; mbreting@MundellAssociates.com).

Sincerely,
MUNDELL & ASSOCIATES, INC.



Mark E. Breting, L.P.G.
Senior Project Geologist



John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

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Attachment 1:

Second Revised Work Plan for the Third Round of CAP18 ME™ Injections

cc: Mr. Peter Cappel, AMMH

ATTACHMENT 1

***February 20, 2013 Second Revised Work Plan for the
Third Round of CAP18 ME™ Injections***



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February 20, 2013

Mr. Corey Webb
Section Chief
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Office of Land Quality
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Re: **Second Revised Work Plan for Third Round of CAP 18 ME™ Injections**
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana 46222
IDEM Incident # 0000198
IDEM VRP # 6061202
MUNDELL Project No. M01046

Dear Mr. Webb:

This *Second Revised Work Plan for the Third Round of CAP18 ME™ Injections* is being submitted to the Indiana Department of Environmental Management (IDEM) by MUNDELL & ASSOCIATES, INC. (MUNDELL), on behalf of AMMH, to describe and seek IDEM approval for upcoming remediation activities at the Site. The revisions to the previous work plan have been made based on data gathered from the additional wells installed across the study area in 2011, and subsequent quarterly monitoring conducted during 2012. The following sections provide detailed discussions regarding the design of this third and (anticipated) final CAP 18 ME™ injection at the Site. Previous CAP 18 ME™ injections were completed at the Site in August 2007 and February 2009.

The concentration trends of tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) in **Source Areas A, B, and C** at the Site have indicated that dechlorination of the chemicals is still occurring (refer to the *Quarterly Monitoring Progress Report – 4th Quarter 2011* dated January 31, 2012, for specific data summaries and figures). The locations of **Source Areas A, B, and C** are included in this Second Revised Work Plan (**Figure 1** and **Figure 2**).

Based on a review of the analytical data, it appears that complete dechlorination of all of the PCE is not occurring in **Source Areas A, B, and C**, as observed in the concentration trends observed in monitoring wells MMW-P-02, MMW-C-01, and MMW-P-11S, (**Source Area A**), MMW-8S, MMW-P-12S, and MMW-P-12D (**Source Area B**), and MMW-1S, MMW-9S, and MMW-10S (**Source Area C**). It is MUNDELL's opinion that additional enhanced in-situ biodegradation efforts and the injection of additional CAP 18 ME™ product are required in these areas.

CAP 18 ME™ BIOREMEDIATION DESIGN AND IMPLEMENTATION

CAP 18 ME™ Design

The amount and distribution of CAP 18 ME™ needed for each area to be injected (**Injection Areas**) was designed taking several factors into account as well as the practical experience of the manufacturers of CAP 18 ME™, the Carus Corporation (Carus). The amount of CAP 18 ME™ to inject into the **Injection Areas** was calculated using the *CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software* provided by Carus. This software takes into account the treatment area volume (based on plume size) and the soil characteristics (type, bulk density, fraction of organic carbon, total and effective porosity, hydraulic gradient and conductivity). The spreadsheet then calculates the dissolved and sorbed contaminant demand, as well as the background demand from geochemical parameters (*i.e.*, the site levels of dissolved oxygen, nitrate, manganese, iron, sulfate and hardness). These parameters then factor into the stoichiometric demand for hydrogen, and the corresponding amount of CAP 18 ME™ needed for a particular treatment area. Microbial degradation and design contingency factors of safety are considered as well in the calculations.

For this site, a factor of safety of 2 was selected to allow for degradation and design uncertainties. Spreadsheet assumptions for the calculation of demand for CAP 18 ME™ for each **Injection Area** are shown in **Table 1**. Computations estimated that approximately 2,011 lbs, 6,821 lbs, 2,265 lbs, and 5,902 lbs of CAP 18 ME™ are needed for **Injection Areas A-1, B-1, B-2 and C-1**, respectively, based on the cumulative indicator compound concentrations and geochemistry parameters obtained (predominantly) during 2011 and 2012 quarterly sampling events.

Several iterations of CAP 18 ME™ injection distribution were evaluated using the *Bioremediation Products Design Software* and considering Site physical features. The first consideration was to determine what type of application would best fit the remaining plume's size and distribution in each **Source Area** given the geology, geochemistry and indicator compounds. The saturated zone within each **Source Area** has poorly-graded, medium sand (SP) underlain by well-graded, gravelly sand (SW).

MUNDELL's experience with CAP 18 ME™ in sands at the Michigan Plaza Site confirms that fatty acids that are broken down through beta-oxidation can travel

distances as great as 75 ft to 100 ft from the place of injection, thereby allowing “treatment” to continue hydraulically downgradient as the fatty acids migrate and continue to lend hydrogen atoms for reductive dechlorination. Given this geologic advantage and the plumes being situated as they are in relation to Michigan Street and the Plaza strip mall, it was determined that a ‘treatment curtain’ design distribution would be effective.

The injection spacing for the selected design is largely determined by the aquifer’s ability to receive the product. An injection spacing of 10 ft to 15 ft on centers is considered very effective for the sands encountered at the Site. Curtain ‘rows’ stacked three deep are planned for **Injection Area C-1**, four rows are planned for **Injection Area B-1**, two rows are planned for **Injection Area B-2**, while a double-row curtain design will be implemented in **Injection Area A-1**. Curtain areas are generally oriented perpendicular to either the plume or parallel with building walls or sewer transects that control injection accessibility. Anticipated injection locations are presented on **Figure 2**. This configuration was designed to provide the most thorough coverage per **Injection Area**. After the number of points was established per **Injection Area**, the total oil demand for each **Injection Area** was divided by the number of points.

Based on previous CAP 18 ME™ injection events at the Site performed in August 2007 and February 2009, several design factors have been implemented. This design accounted for injecting the CAP 18 ME™ conservatively throughout a 12-foot thickness in the upper saturated zone at each injection point in **Injection Area A-1**, and throughout a 20-foot thickness in the upper saturated zone at each injection point in **Injection Areas B-1, B-2, and C-1**. These injection thicknesses allow for introduction of the product throughout the sand and gravel aquifer down into the top of the underlying silty clay glacial till, which acts as a barrier to further vertical groundwater movement. In **Injection Area B-1**, an additional set of injection locations positioned adjacent to monitoring wells MMW-P-12S and MMW-P-12D have been included in the design to provide added treatment across an approximate five foot vertical thickness, focused on the smear zone and water table in this area.

As an additional enhancement to the injection plan, halo-respiring bacteria will be added to the CAP 18 ME™. The bacteria will be added to the CAP 18 ME™ material in optimal amounts prior to injection via drilling rods. The addition of the bacteria will serve to more rapidly increase the mass of bacteria acting on the remaining residual chlorinated material.

Introduction of the CAP 18 ME™ into the aquifer at 3-foot depth intervals has proven to be the most effective injection strategy during the previous two injection events. In addition, injection of twice as much product into the upper 10 feet of the saturated zone as compared to greater depths places the product in the zone most impacted by previous releases from the former Accent cleaners. This will focus the remedial effort on

the drycleaner impact as opposed to treatment of deeper impacts associated with an upgradient source.

As previously completed during prior injection events, MUNDELL will also monitor groundwater levels in nearby monitoring wells during the injection process to document the temporal effects the CAP 18 ME™ injection rate might have, if any, on vicinity water levels. These wells will include (see **Figure 1** and **Figure 2**):

Source Area A:	MMW-P-02, MMW-P-03S/D, MMW-P-11S/DR, MMW-P-13S/D, and MW-170S/D
Source Area B1:	MMW-P-12S/D, MMW-P-07, and MW-167S/D
Source Area B2:	MMW-8S
Source Area C:	MMW-1S, MMW-9S, MMW-10S, MMW-12S, MMW-14D

Health and Safety

MUNDELL will prepare a Health and Safety Plan to ensure that activities for remediation will be conducted with industry standard safety measures, and that the surrounding public would not be threatened by any of the activities the occurred.

MUNDELL will contact Indiana Plant Protection Service (IUPPS) for utility locates in the specific areas being drilled. As a supplement to this utility locate, MUNDELL will also utilize its own geophysics department to provide more in depth locates of utilities and obstructions. Locations will be adjusted based upon the results of these utility investigations as needed.

CAP 18 ME™ Injection Application

CAP 18 ME™ injection remediation activities are anticipated to begin in April 2013, or after approval from IDEM is received. CAP 18 ME™ will be injected into each injection point using the following protocol:

- 1) At each injection point in Area A-1, the Geoprobe® will direct push the drill rods approximately 12 feet into the saturated zone. Based on historic gauging data, the terminus depth will be approximately 31-32 ft-bgs.
- 2) At each injection point of Areas B-1, B-2, and C-1, the Geoprobe® will direct push the drill rods down to the bottom depth, as determined by the depth of the lower clay till layer.
- 3) The total poundage of CAP 18 ME™ loading designed per boring and a conversion of 7.7 pounds per gallon will be used to estimate the amount of gallons required. From this amount, the estimated amount of 3-foot lifts will be calculated, with the bottom lift being just into the clay till, and the top lift being

anywhere from 1 to 3 feet above the observed water table (to account for seasonal fluctuations).

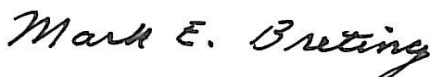
- 4) Calculated volumes of CAP 18 ME™ will be pumped from the 55-gallon drums into a hopper, bacteria will be added, and this mix will be pumped utilizing a diaphragm pump and compressor through tubing sealed and connected to the Geoprobe® tooling rods down into the bottom of the drill rods, where it is slowly injected under pressure into the formation at the 3-foot lift intervals and loading requirements established above. At completion, each boring will be filled with granular bentonite and capped with either topsoil if in grassy areas, or asphalt patch in the parking areas.
- 5) MUNDELL will collect pre-injection and post-injection static water level readings in monitoring wells nearest the injection locations to evaluate the anticipated radius of influence (of 10 feet). The readings will be summarized in a table included in the 2nd Quarter 2013 *Quarterly Monitoring Report* for the Site.

Table 2 is provided which summarizes the planned injection quantities for each injection point, and each ***Injection Area***.

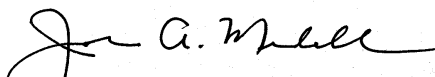
We appreciate the opportunity to update IDEM on the proposed upcoming remedial activities proposed at the Site, and look forward to IDEM's approval. If you have any questions, please do not hesitate to contact us at (317) 630-9060 or via email (jmundell@MundellAssociates.com; mbreting@MundellAssociates.com).

Sincerely,

MUNDELL & ASSOCIATES, INC.



Mark E. Breting, L.P.G.
Senior Project Geologist



John A. Mundell, P.E., L.P.G.
President/Senior Environmental Consultant

Attachments: Tables
Figures

cc: Mr. Peter Cappel, AMMH

TABLES

Table 1	CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software Input Parameters and Estimation Methodology
Table 2	Proposed CAP 18 ME™ Injection Locations Including Anticipated Injection Amounts

TABLE 1
CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software
Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA A-1		
Treatment Area Volume		ESTIMATION METHOD
Curtain Length	50 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	12 feet	Saturated interval thickness in Injection Area A-1
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.214 mg/L	Averaged MMW-P-11S and MMW-P-02 groundwater concentrations from Quarters 1-4, 2011.
TCE	0 mg/L	
DCE	0.042 mg/L	
VC	0.226 mg/L	
Background Demand		
Oxygen	0.484 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4, 2011 and 2012. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S, MMW-P-02 and MMW-C-02)
Nitrate	0.64 mg/L	Averaged groundwater concentrations. (Wells included: MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S, and MMW-P-02)
Manganese	2.0 mg/L	Default Value
Iron	2.62 mg/L	Averaged groundwater concentrations. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S and MMW-P-02)
Sulfate	71.99 mg/L	Averaged groundwater concentrations from Quarters 1-4, 2011 and 2012. (Wells included: MMW-P-05, MMW-P-06, MMW-P-04, MMW-P-03S, MMW-P-03D, MMW-P-11S, MMW-P-02 and MMW-C-02)
Hardness	496 mg/L	Averaged groundwater concentrations from Quarters 1-4, 2010. (Wells included: MMW-P-03S)

TABLE 1
CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software
Input Parameters and Estimation Methodology

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-1		
Treatment Area Volume		ESTIMATION METHOD
Curtain Length	60 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area B-1 (three injection locations adjacent to MMW-P12S and MMW-P-12D will have a treatment zone limited to approximately five feet across smear zone/water table)
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.0476 mg/L	Averaged groundwater concentrations as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-01, MMW-P-12S, MMW-P12D)
TCE	0.0457 mg/L	
DCE	0.850 mg/L	
VC	2.324 mg/L	
Background Demand		
Oxygen	0.225 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Nitrate	0 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Manganese	2.0 mg/L	Default Value
Iron	2.1 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-12S, MMW-P12D)
Sulfate	140 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-P-08)
Hardness	688 mg/L	

TABLE 1
CAP 18™ and CAP 18 ME™ Anaerobic Bioremediation Products Design Software
Input Parameters and Estimation Methodology

Michigan Plaza
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Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-2		
Treatment Area Volume		ESTIMATION METHOD
Curtain Length	22 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area B-2
Well Spacing	10 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.180 mg/L	Averaged groundwater concentrations as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07, MMW-P-12S, MMW-P12D)
TCE	0.0195 mg/L	
DCE	0.254 mg/L	
VC	0.152 mg/L	
Background Demand		
Oxygen	0.750 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Nitrate	16.3 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Manganese	2.0 mg/L	Default Value
Iron	3.32 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Sulfate	105.7 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 , 2011. (Wells included: MMW-8S, MMW-P-08, MMW-P-07)
Hardness	707.8 mg/L	

TABLE 1
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Input Parameters and Estimation Methodology

Michigan Plaza
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Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA C-1		
Treatment Area Volume		ESTIMATION METHOD
Curtain Length	55 feet	Based upon remaining chlorinated solvent impacts as indicated by Quarterly monitoring activities.
Thickness of Treatment Zone	20 feet	Saturated interval thickness in Injection Area C-1
Well Spacing	12 feet	An injection spacing of 10 - 15 ft on centers is considered very effective for sandy saturated units, as encountered at the Site during previous soil investigations.
Treatment Area Characteristics		
Nominal Soil Type	SAND	Based upon field conditions observed during previous soil investigations.
Total Porosity	0.38	Default Values
Effective Porosity	0.29	
Hydraulic Conductivity	28.5 ft/d	
Hydraulic Gradient	0.003975 ft/ft	Calculated using the average hydraulic gradient from Quarters 1-4, 2010. The hydraulic gradient was calculated for each Quarter, then averaged across the four Quarters.
CAP-18 Lifespan	2 years	Based upon the estimated CAP 18 ME™ lifetimes observed following the 2007 and 2009 injection events.
Dissolved Contaminant Demand		
PCE	0.291 mg/L	Averaged MMW-1S groundwater concentrations from Quarters 1-4 ,2011.
TCE	0.028 mg/L	
DCE	0.028 mg/L	
VC	0.021 mg/L	
Background Demand		
Oxygen	0.6 mg/L	Averaged low flow sampling parameters as measured during Quarters 1-4 ,2011 and 2012. (Wells included: MMW-1S, MMW-8S, MMW-9S, MMW-10S, MMW-11S and MMW-12S)
Nitrate	2.56 mg/L	Averaged groundwater concentrations collected Quarter 1-4, 2011 and 2012. (Wells included: MMW-9S and MMW-11S)
Manganese	2.0 mg/L	Default Value
Iron	3.26 mg/L	Averaged groundwater concentrations from Quarter 1-4, 2011 and 2012. (Wells included: MMW-9S and MMW-10S, MMW-P-03S, MMW-P-08)
Sulfate	133.09 mg/L	Averaged groundwater concentrations from Quarters 1-4 ,2011. (Wells included: MMW-9S, MMW-10S, MMW-P-03S and MMW-P-08)
Hardness	688 mg/L	

TABLE 2
Proposed CAP 18 ME™ Injection Locations
Including Anticipated Injection Amounts
April 2013

Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA A-1

Injection Point Identification	Planned Injection Mass (lbs)	Planned Injection Volume (gallons)
51	118.29	15.4
52	118.29	15.4
53	118.29	15.4
54	118.29	15.4
55	118.29	15.4
56	118.29	15.4
57	118.29	15.4
58	118.29	15.4
59	118.29	15.4
60	118.29	15.4
61	118.29	15.4
62	118.29	15.4
63	118.29	15.4
64	118.29	15.4
65	118.29	15.4
66	118.29	15.4
67	118.29	15.4
INJECTION AREA A-1: TOTAL INJECTION AMOUNTS	2,011	261.2

INJECTION AREA B-1

24	360.90	46.9
25	360.90	46.9
26	360.90	46.9
27	360.90	46.9
28	360.90	46.9
29	360.90	46.9
30	360.90	46.9
31	360.90	46.9
32	360.90	46.9
33	360.90	46.9
34	360.90	46.9
35	360.90	46.9
36	360.90	46.9
37	360.90	46.9
38	360.90	46.9
39	360.90	46.9
40	360.90	46.9
41	360.90	46.9
42	108.27	14.1
43	108.27	14.1
44	108.27	14.1
INJECTION AREA B-1: TOTAL INJECTION AMOUNTS	6,821	886

TABLE 2
Proposed CAP 18 ME™ Injection Locations
Including Anticipated Injection Amounts
April 2013

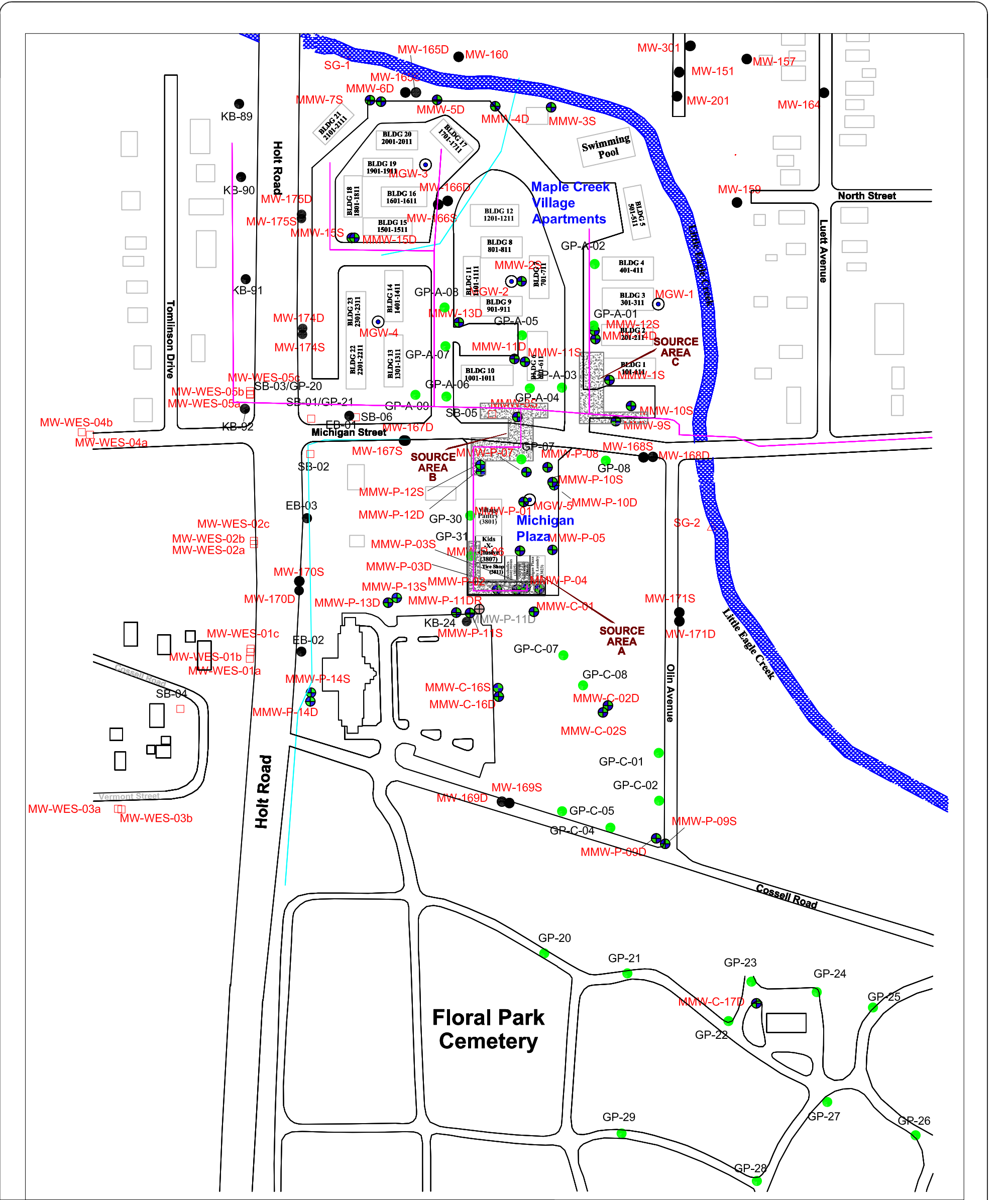
Michigan Plaza
3801-3823 West Michigan Street
Indianapolis, Indiana
MUNDELL Project No. M01046

INJECTION AREA B-2		
45	377.50	49.0
46	377.50	49.0
47	377.50	49.0
48	377.50	49.0
49	377.50	49.0
50	377.50	49.0
INJECTION AREA B-2: TOTAL INJECTION AMOUNTS	2,265	294
INJECTION AREA C-1		
Injection Point Identification	Planned Injection Mass (lbs)	Planned Injection Volume (gallons)
1	256.61	33.3
2	256.61	33.3
3	256.61	33.3
4	256.61	33.3
5	256.61	33.3
6	256.61	33.3
7	256.61	33.3
8	256.61	33.3
9	256.61	33.3
10	256.61	33.3
11	256.61	33.3
12	256.61	33.3
13	256.61	33.3
14	256.61	33.3
15	256.61	33.3
16	256.61	33.3
17	256.61	33.3
18	256.61	33.3
19	256.61	33.3
20	256.61	33.3
21	256.61	33.3
22	256.61	33.3
23	256.61	33.3
INJECTION AREA C-1: TOTAL INJECTION AMOUNTS	5,902	766.5
SITE-WIDE Injection Totals	16,999	2,208

FIGURES

Figure 1 Site Plan

Figure 2 Proposed CAP 18 METM Injection Locations



— Fence

● **MMW-P-06**

● **MW-160/KB-90**

□ **MW-WES-01A/SB-02**

△ **SG-1**

○ **MGW-O1**

MUNDELL Monitoring Well

ENVIRON Monitoring Well/Soil Boring

U.S. EPA Monitoring Well/Soil Boring

Stream Gauge Location

MUNDELL Soil Gas Well

● **GP-29**

— Sanitary Sewer

— Storm Sewer

N

0

SCALE

200

feet

ENVIRON/Keramida Monitoring Well Locations Referenced from Keramida Environmental, Inc. Project No. 2829 March 13, 2002

